EXHIBIT E

APPENDIX 4

Study Code 17/359

...Rapid
Responsive
Reliable

Laboratory bioassay to assess the efficacy of an ultrasonic device at repelling cockroaches, ants, and spiders

i2LResearch USA, Inc.
1430 Joh Avenue
Suite M
Baltimore, MD 21227
USA

Jennifer Hostetler
October 2017

Certification

This report represents a true and accurate record of all data obtained.

Signed..... Date.....30 Oct 2017

Timothy Foard
Study Director

Approved by..... Date.....30 October, 2017

Kristine Styer
Executive Director

All raw data and a copy of the final report will be archived at i2LResearch for a period of ten years. At the end of this period all data relating to this report will either be retained by i2LResearch for a further disclosed period of time at an extra cost, destroyed at the Sponsor's request or passed on to the Sponsor at the Sponsor's expense.

Report circulated to: Bursor & Fisher PA
University of Kentucky
i2LResearch USA, Inc. (1 copy)

Contents

Page No.

Study Information

Laboratory bioassay to assess the efficacy of an ultrasonic device at repelling cockroaches, ants, and spiders

i. Testing facility: i2LResearch USA, Inc.
1430 Joh Avenue
Suite M
Baltimore, MD 21227
USA

ii. Sponsor: Bursor & Fisher PA
888 Seventh Avenue
New York, NY 10019
USA

Sponsor Representative: Michael F. Potter
University of Kentucky
Lexington, KY 40546
USA

iii. i2LResearch Study code: 17/359

iv. Study start date: August 16, 2017
Experimental start date: October 2, 2017
Experimental end date: October 30, 2017
Study end date: October 30, 2017

v. Study Director: Timothy Foard

vi. Test Substances:

Test Substance	EPA Reg. No.	Batch/Lot No.	Number	Expiry date*	i2LResearch code numbers
Bell + Howell Repeller #50167	081956-CHN-001	HY-04-17	3 units	21 Sept 2019	17092131-3

*i2L default expiry date

Summary

A laboratory trial was conducted to assess the efficacy of the Bell + Howell Repeller #50167 ultrasonic device at repelling German cockroaches (*Blattella germanica*), cellar spiders (*Physocyclus globosus*), and odorous house ants (*Tapinoma sessile*). Arthropods were placed in one chamber of a two-chambered arena, the device was turned on, and arthropods were allowed to distribute freely for 6 (spiders), 7 (ants), or 10 (cockroaches) days. Observations as to arthropod location within the arena were made at intervals throughout the study duration.

The percentage of movement in relation to an untreated (no device) control was calculated, and a summary of results can be seen in Table 1 below. Overall, directional movement away from the enclosures containing the devices was not observed in any of the species, with the exception of one replicate out of three of the treated cockroaches, which exhibited statistically significant movement on day 10 of treatment (however, this replicate still demonstrated <40% percent movement).

Table 1. Final average movement (relative to control) of arthropods exposed to the Bell + Howell Repeller #50167 ultrasonic device.

Species	Percent movement	p-value*
German cockroach	13.0 ± 13.3	<0.0001
Cellar spider	0.0 ± 6.5	1.0000
Odorous house ant	-0.3 ± 0.0	0.277

*compared to untreated (no device) control using a k-proportions (Chi-square) test; $\alpha = 0.05$.

It can be concluded that the Bell +Howell Repeller #50167 ultrasonic device was not effective at repelling cockroaches, spiders, or ants during the trial duration.

Aim

A laboratory trial was required to assess the efficacy of the Bell + Howell Repeller #50167 ultrasonic device at repelling German cockroaches, cellar spiders, and odorous house ants.

Methodology

Test system

The following species were obtained from the listed sources for testing:

Test system	Species	Strain	Source
German cockroach	*Blattella germanica*	Laboratory cultured	i2L USA colony
Odorous house ants	*Tapinoma sessile*	Field-collected	College Park, Maryland
Cellar spiders	*Physocyclus globosus*	Field-collected	Bugs of America, Oracle, AZ

Test substance and application

The Sponsor provided samples of the following:

1. Bell + Howell Repeller #50167 ultrasonic device

Devices were mounted on the top of one enclosure in each test arena, with the speakers facing downward.

An untreated control group, with no electronic units on either side of the test arena, was also assessed for comparative purposes, for a total of two treatments.

Test arenas

Testing took place inside test arenas inside three windowless rooms kept at ambient indoor temperature and humidity. Test arenas consisted of paired enclosures, with a gated conduit running between each enclosure to allow arthropods to access each enclosure when the gate was open.

Methods

Prior to arthropod introduction, each test enclosure was stocked with food (dog food for cockroaches, cotton ball saturated with 10% sucrose solution for ants, and live cockroaches for spiders).

Testing for Cockroaches – One hundred mixed stage nymphs and adults were placed inside cardboard tubes 2.5 inches in diameter and 12 inches long capped at both ends with plastic caps. These served as 'condos' (harborages) and the cockroaches were allowed to acclimate, undisturbed, inside the closed tubes for 2 hours. At the end of the 2-hour acclimation period, the tubes containing the cockroaches were placed inside the enclosure with the device turned off, while a similar cardboard harborage with no cockroaches was placed into the other. The caps were gently removed and the tube was oriented so that the openings faced the front to allow viewing when the enclosure was sealed shut. After a 24 h initial acclimation period, the gates on each end of the conduit connecting the paired enclosures were opened for another 24 h, allowing the roaches to move freely between the two sides. Following the 48-h acclimation, the device was turned on continuously for 10 days and the cockroaches allowed to distribute undisturbed. Lights remained off except during visual counts.

Figure 1. Enclosure used for cockroaches and spiders. Device located in left enclosure

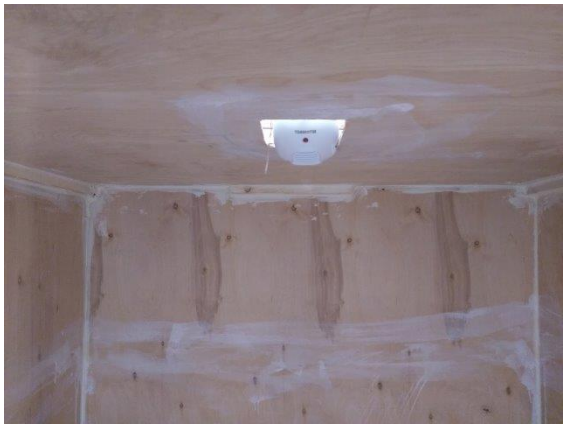


Figure 2. Closeup of left chamber, showing repellent device.

Testing for Spiders – Setup was identical to cockroaches, except no cardboard harborage was used with spiders. Spiders (15 per replicate) were released into the center of the enclosure with the (turned off) device and allowed to acclimate for 24 hours because of time restraints. The gates remain closed during the acclimation period. After this period, the gates were opened and the device turned on continuously for 6 days and the spiders allowed

to distribute undisturbed. Some live cockroaches were added in the enclosure for food. As with cockroaches, the room lights remained off except during visual counts.

Testing for Ants – To minimize the likelihood for ants to escape from the enclosures, some adjustments to the experiment design were necessary. Field-collected colonies were initially placed in a glass aquarium containing artificial nest chambers. These chambers (Figures 3 and 4) consist of plastic 55mm Petri dishes with the bottom dish covered with hardened plaster of Paris and the sides with slits or holes made for entry into the chamber. One milliliter of water was added to the plaster to create a moist environment for the ants.

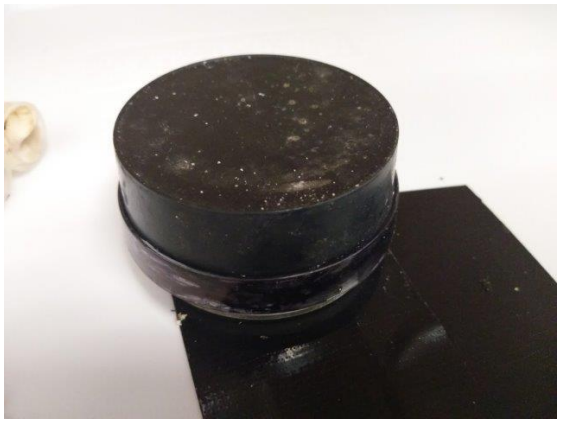


Figure 3. Ant harborage with dark cover in place.

Figure 4. Ant harborage with dark cover removed, exposing ants

The clear lid was placed over the bottom and another inverted bottom half of a Petri dish painted black with India ink was placed over the lid to provide a dark environment. The harborages were checked several times daily for ants to occupy, and when 100-150 ants were present, each of the harborages with the ants were removed and placed inside a 1-quart wide mouth jar containing food and a water source. They were allowed to acclimate in the chambers until it was time to test the device.

A smaller arena (Figure 5) was placed inside each enclosure. It consisted of a plastic lid of a large storage box, 16” x 22” x 1” with the corners and sides painted with a Teflon material to prevent escapes. A 5-foot section of ¾ inch CPVC pipe was used as the connection between the two rooms. A 12-inch section of each end of the pipe was also painted with the Teflon material, so that the ants are only allowed access inside the pipe. A strip of card stock paper served as a ramp (Figure 6) from the floor of the smaller arena to the inside of the pipe. Because of time restraints the ants were allowed to acclimate inside the smaller arena in the enclosure for 24 hours. During this period, the ramp was removed so that ants

were not able to cross over into the next enclosure. Because the smaller arena confined ant movement within the enclosure, the front of the enclosure remained open at all times in order to make visual counts.

At the start of the test the distribution of ants recorded, the ramps put in place, and the devices were turned on. Observations were made inside the pipe using an endoscope (Depstech® WiFi Endoscope). The ultrasonic device was left on continuously for 7 days and the ants allowed to distribute undisturbed. Room lights remained on during the day and were turned off at the end of the work day.

Figure 5. Ant test setup in small arena within enclosure.

Figure 6. Closeup of ramp connecting pipe to floor of arena

Assessments

Visual counts of the location of the arthropods were made at days 0, 1, 3, 5, 6 (spiders), 0, 1, 3, 5, and 7 (ants), and 0, 1, 3, 5, and 10 (cockroaches). At each assessment period, the gates in each test arena were closed before counts were made, and reopened once counts were completed. Observations were made visually using a head light and a black trash bag held to create a shadow, which reduces reflections off the acrylic panes. Only in the interior of the cardboard connecting tube were assessments not made in the case for cockroaches and spiders. For ants, visual observations were also made, and an endoscope was used to locate any ants within the pipe.

Data reporting and analyses

The number of arthropods in each location were totaled and averaged across all three replicates, and the standard errors calculated. The percent movement, defined as movement away from the point of introduction (enclosure containing the device) in test arenas

compared to the point of introduction in control arenas was calculated with the following formula:

$$\% \text{ Movement} = (100 - ((t/T)/(c/C))) * 100$$

Where t = number of arthropods in the treated (release) enclosure of the test arena

T = total number of arthropods in the test arena

c/C = average of the (number of arthropods in the release enclosures of the control arenas, divided by the total number of arthropods in the control arenas)

The percent movement was averaged across all three replicates and the standard error calculated. A k-proportions (Chi-square) test ($\alpha = 0.05$) was conducted for the final day of observations for each species, to determine if any detected movement was statistically different from that observed in the untreated controls.

Results

Assessment results are summarized in Table 2 and Figures 7-9 below. See Appendix I for full raw data.

Some of the cockroaches upon initial release (that is, when the caps were removed from the harborages) slowly dispersed from the harborage. Most, however, remained in the harborage. Following the initial introduction, little movement overall was observed when assessments were made in two of the three test rooms. Cockroaches in one of the rooms containing a repellent device exhibited considerable movement (statistically significant) between chambers, but this movement was not consistent across any of the other test rooms containing the devices. Numbers of cockroaches observed in this room was much less than one hundred; the remaining cockroaches were present in the cardboard tube, where it was not possible to make assessments without the risk of disturbance or escapes. Their presence inside the connecting tube was confirmed when it was time to remove them and introduce the spiders for the next testing phase.

The cellar spiders were observed on the ceiling of the enclosure containing the device as well as in the corners. They were observed capturing and feeding on cockroaches provided as food, and a small degree of cannibalism was also observed. Overall directional movement away from the enclosures containing the devices over time was not observed.

The ants remained in their introduction containers for the duration of the test, with directional movement away from the enclosure containing the devices not observed. A single ant was observed moving away from the release enclosure in one of the untreated control arenas.

It can be concluded that the Bell+Howell Repeller #50167 ultrasonic device was not effective at repelling cockroaches, spiders, or ants during the trial duration.

Table 2. Movement (relative to control) of arthropods exposed to the Bell + Howell Repeller #50167 ultrasonic device.

German cockroach		
	Percent movement	
Day	Average	SE
0	0.0	0.0
1	1.5	1.8
3	4.6	5.0
5	4.6	5.0
10	13.3	13.0
Cellar spider		
	Percent movement	
Day	Average	SE
0	0.0	0.0
1	2.2	2.2
3	6.8	6.0
5	2.3	4.0
6	0.0	6.5
Odorous house ant		
	Percent movement	
Day	Average	SE
0	0.0	0.0
1	0.0	0.0
3	0.0	0.0
5	-0.3	0.0
7	-0.3	0.0

Figure 7. Movement (relative to control) in German cockroaches exposed to the Bell + Howell Repeller #50167 ultrasonic device.

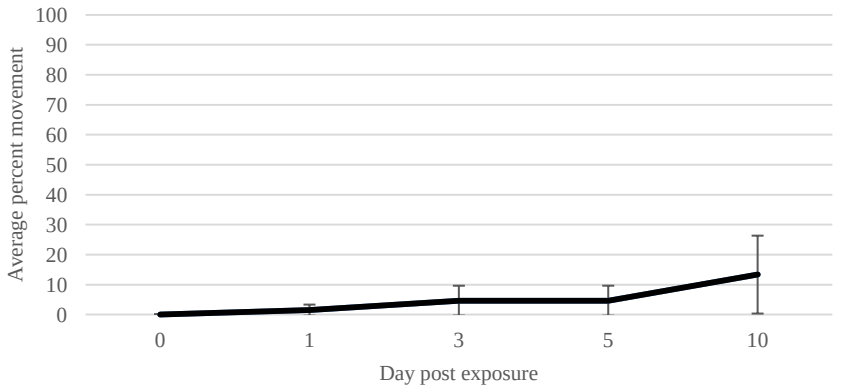


Figure 8. Movement (relative to control) in cellar spiders exposed to the Bell + Howell Repeller #50167 ultrasonic device

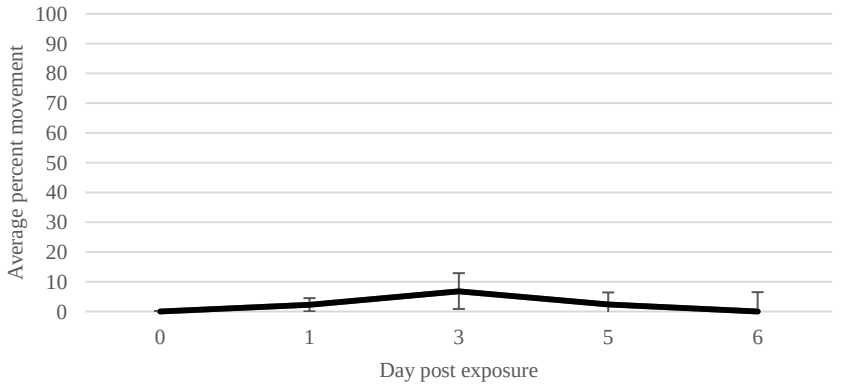
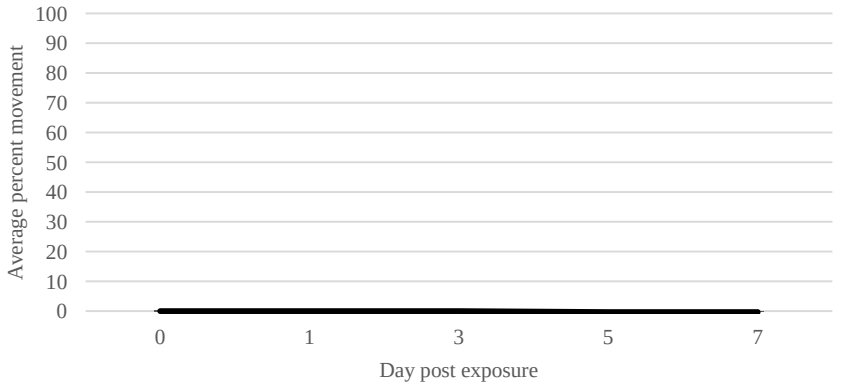


Figure 9. Movement (relative to control) in odorous house ants exposed to the Bell + Howell Repeller #50167 ultrasonic device



Appendix I – Raw Data Tables

Study Code 17/359

Species:	**German cockroach (*Blattella germanica*)**					
Treatment:	Control					
	Replicate 1		Replicate 2		Replicate 3	
Day	Release side	Non-release side	Release side	Non-release side	Release side	Non-release side
0	100	0	100	0	100	0
1	59	0	87	0	95	1
3	95	0	91	0	97	1
5	92	0	94	0	91	1
10	89	0	93	0	87	2
Treatment:	Bell-Howell Repeller #50167					
	Replicate 1		Replicate 2		Replicate 3	
Day	Release side (with device)	Non-release side	Release side (with device)	Non-release side	Release side (with device)	Non-release side
0	99	0	99	0	100	0
1	92	0	69	4	96	0
3	90	0	80	14	91	0
5	95	0	57	10	90	0
10	88	0	47	31	90	2
Species:	**Cellar spider (*Achaearanea tepidariorum*)**					
Treatment:	Control					
	Replicate 1		Replicate 2		Replicate 3	
Day	Release side	Non-release side	Release side	Non-release side	Release side	Non-release side
0	15	0	15	0	15	0
1	14	0	15	0	15	0
3	15	0	15	0	14	1
5	13	2	15	0	15	0
6	15	0	13	2	13	2
Treatment:	Bell-Howell Repeller #50167					
	Replicate 1		Replicate 2		Replicate 3	
Day	Release side (with device)	Non-release side	Release side (with device)	Non-release side	Release side (with device)	Non-release side
0	15	0	15	0	15	0
1	15	0	15	0	14	1
3	14	1	12	3	15	0
5	13	2	14	1	15	0
6	12	3	14	1	15	0
Species:	**Odorous house ants (*Tapinoma sessile*)**					
Treatment:	Control					
	Replicate 1		Replicate 2		Replicate 3	
Day	Release side	Non-release side	Release side	Non-release side	Release side	Non-release side
0	150	0	110	0	150	0
1	150	0	110	0	150	0
3	150	0	110	0	150	0
5	150	0	109	1	150	0
7	15	0	109	1	150	0
Treatment:	Bell-Howell Repeller #50167					
	Replicate 1		Replicate 2		Replicate 3	
Day	Release side (with device)	Non-release side	Release side (with device)	Non-release side	Release side (with device)	Non-release side
0	100	0	100	0	125	0
1	100	0	100	0	125	0
3	100	0	100	0	125	0
5	100	0	100	0	125	0
7	100	0	100	0	125	0

Appendix II— Statistical Calculations

Chi-square test: German cockroaches

Position of cockroaches at 10 days			
Formulation	Untreated	Treated	Sum
Control	2	269	271
Device	33	225	258

XLSTAT 2017.5.47467 - k proportions test

Significance level (%): 5

Seed (random numbers): 4397536

Chi-square test:

Chi-square (Observed value)	31.075
Chi-square (Critical value)	3.841
DF	1
p-value	< 0.0001
alpha	0.05

Test interpretation:

H0: The proportions are equal.

Ha: At least one proportion is different from another.

As the computed p-value is lower than the significance level alpha=0.05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

Chi-square test: Cellar spiders

Position of spiders at 6 days			
Formulation	Untreated	Treated	Sum
Control	0	0	0
Device	0	0	0

XLSTAT 2017.5.47467 - k proportions test

Significance level (%): 5

Seed (random numbers): 4505839

Chi-square test:

Chi-square (Observed value)	0.000
Chi-square (Critical value)	3.841
DF	1
p-value	1.000
alpha	0.05

Test interpretation:

H0: The proportions are equal.

Ha: At least one proportion is different from another.

As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.

The risk to reject the null hypothesis H0 while it is true is 100.00%.

Chi-square test: Odorous house ants

Position of ants at 7 days			
Formulation	Untreated	Treated	Sum
Control	0	0	0
Device	0	0	0

XLSTAT 2017.5.47467 - k proportions test

Significance level (%): 5

Seed (random numbers): 4445359

Chi-square test:

Chi-square (Observed value)	1.184
Chi-square (Critical value)	3.841
DF	1
p-value	0.277
alpha	0.05

Test interpretation:

H0: The proportions are equal.

Ha: At least one proportion is different from another.

As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.

The risk to reject the null hypothesis H0 while it is true is 27.66%.